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Navy Physician Provides Ebola Treatment Expertise to DoD Team

Story by Army Sgt. 1st Class Tyrone C. Marshall Jr., DoD NEWS, Defense Media Activity



Navy Cmdr. James Lawler (right) demonstrates the removal of personal protective equipment to members of a 30-person team training at San Antonio Military Medical Center, Texas, Oct. 24. The team is training to respond in the event of additional Ebola cases in the United States. (Photo taken by Army Sgt. 1st Class Tyrone C. Marshall Jr.)

JOINT BASE SAN ANTONIO-FORT SAM HOUSTON – The Defense Department's unprecedented mission to establish a 30-member team in support of potential U.S. Ebola virus outbreaks has brought numerous military medical health professionals together.

One member of the joint team brings real-world experience treating Ebola patients to the training course.

Navy Cmdr. James Lawler, chief of the clinical research department of the bio-defense research directorate, Naval Medical Research Center, Silver Spring, Maryland, discussed his role on the team serving as a subject-matter expert on Ebola treatment.

"I've had the opportunity to work in a couple of isolation treatment units in sub-Saharan Africa," said Lawler. "Recently, in May, I was at the Ebola treatment unit in Conakry, Guinea, as a consultant for the World Health Organization."

He also worked with the local health ministry and with Doctors Without Borders, which runs the Ebola treatment unit in Conakry.

Advances in Ebola Treatment

Lawler, an 18-year Navy veteran, thinks the treatment of Ebola has "evolved significantly" due to the outbreak in West Africa.

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NMRC Commanding Officer's Message



I am always pleased to see our researchers garner national or international attention. Lt. Cmdr. Ben Espinosa, serving as the OIC of one of NMRC's Mobile Laboratories in Liberia, has become a regular in dealing with the media. While driving one night after work, I was listening to Ben being interviewed on NPR and then at home flipped on the television to see him being interviewed on the NBC nightly news.

One of his team members, Lt. Jimmy Regeimbal, was the muscle-flexing star of a NY Times feature photo essay. Cmdr. James Lawler, one of the first 30 member DoD domestic Ebola response team, was impressive in a number of national interviews and in the Navy Medicine social media message about Ebola. Dr. Dan Bausch, head of Virology at NAMRU-6 and a Professor from Tulane University and serving as a WHO consultant on Ebola Virus, has been interviewed by local, national and international news organizations.

Cmdr. David Brett-Major, seconded to the WHO in Geneva, has been a regular on radio interviews in the UK and Australia. I am extremely impressed by the poise, professionalism, and enthusiasm of all who are part of our enterprise supporting DoD's Operation United Assistance. Their work has been spectacular.

It is not just our Ebola work getting attention. I recently attended the American Society of Tropical Medicine and Hygiene annual meeting and Navy Medicine R&D had a significant presence. There were so many presentations and posters from NHRC, NMRC, NAMRU-2, and NAMRU-6 on subjects ranging from malaria to dengue to developing stronger partnerships around the world, I could not attend them all. I had to choose between a symposium led by NMRC researchers on Campylobacter or another celebrating the 70 years of NAMRU-2.

The NAMRU-2 symposium offered a review of the lab's accomplishments such as breakthroughs in the treatment of cholera, the discovery of Capillaria philippensis, controlling plague in Viet Nam, making the connection between Hepatitis B infection and hepatocellular carcinoma (defining the first vaccine-preventable cancer), and many others.

The general consensus held the most important legacy of NAMRU-2 was the relationships established and training provided to our partners in Taiwan, the Philippines, Indonesia, Cambodia, and throughout the region.

**NMRC Commanding Officer sends,
John. W. Sanders III, CAPT, MC, USN**

NAMRU-6 Commanding Officer's Message

Given all the focus on infectious diseases in the news lately, I'd like to talk about something scarier than Ebola or Chikungunya. Bacterial antibiotic resistance has been and will continue to grow as the greatest threat to global health. When I was an intern at Portsmouth Naval Medical Center 20 years ago, a new antibiotic came on the market every year and few patients, outside long term residents of the ICU had antibiotic resistant infections.

Fast forward 20 years and I can think of two patients in the past year, both outpatients who our lab diagnosed with difficult to treat infections and resistance to all antibiotics except one or two agents, that were toxic and difficult to administer. In my lifetime, given the current trajectories, the possibility exists for people to die from a respiratory infection or simple scratch that will be untreatable due to antibiotic resistance, just like in the 1930s. Thankfully things are finally being done to correct the issue. Many teams at universities, pharmaceutical companies and research labs are investigating new antibiotic targets.

The FDA is fast tracking antibiotics and several good bills are in Congress to deal with the issue. Education campaigns are underway to teach patients that the majority of respiratory infections do not require antibiotics and to teach providers to prescribe antibiotics appropriately. DoD is engaged as well. In 2007, efforts were initiated to start a worldwide antibiotic resistant organism repository at Walter Reed Army Institute of Research (WRAIR) and the Military Infectious Diseases Research Program (MIDRP) started a wound infection funding program that quickly reached several million dollars.

Navy Medical Research Center (NMRC) started a wound infection department as did WRAIR to characterize bacteria resistance mechanisms and look for treatments. NAMRU-6, in the past two years, started research into characterizing MRSA and Gram-negative resistant pathogen epidemiology in the developing world. Recently investigators from NMRC partnered with NAMRU-6 to search for bacteriophages in sewer water in Lima. These tiny viruses infect bacteria and destroy them with no effect on the host. An appropriate mix of phages that does not induce antibiotic resistance might be the next cure for a bacterial infection.

I'm proud to be part of these global efforts and confident that one day I will be able look a patient in the eye and say, "I am certain we can cure your infection with no problem."



**NHRC Commanding Officer sends,
Kyle Petersen, CAPT, MC, USN**

(continued from page 1)

"We're really rewriting the textbook on Ebola virus disease ... we've seen so many more cases in this outbreak," said Lawler. "I think we've tried to capture a lot of the lessons that have been learned from West Africa and also from the repatriated patients who have been treated here in the United States. We've learned a lot about effective treatment and how important aggressive supportive care can be, and we've tried to impart those lessons to the team here."

One characteristic of Ebola has been recognized more widely now for contributing to the mortality and morbidity of the disease: diarrhea and the incredible amount of fluid loss and associated electrolyte abnormalities that come with the disease.

"I think being more aggressive in treating those features of the disease has been an advance that this outbreak has precipitated," said Lawler. "I [also] think that there's a better appreciation that aggressive supportive care can make a significant difference in outcome."

Training Focused on Infection Prevention

During the DoD training the 30-member team has undergone, focus has been centered on appropriate infection prevention and control in isolation units; how to set up an isolation unit appropriately; how to use the personal protective equipment; and, how to integrate the appropriate infection control procedures into daily clinical practice.

Team Diversity

"The team's make-up — 10 critical care nurses; 10 noncritical care in-patient nurses; five physicians with infectious disease, internal medicine and critical care experience; and five members trained in infection control specialties is essential to its success," said Lawler. "These complex patients require a significant amount of care and as part of the team we have a core of critical care nurses who are really the most important part of the team."

That intensive nursing, added Lawler, makes the biggest difference in patient outcome and all of those disciplines are important to managing patients.

"We also have some other folks who specialize in things like industrial hygiene and environmental health," said Lawler. "[They] can help with some of the other aspects of setting up a patient care unit that are important."

Lawler added that the infection prevention control practices the team is training on will work if they're done effectively.

"It's important to really rely on your training and to remain focused and deliberate when you're working in a unit," said Lawler. "Errors usually come when people get sloppy; when they get tired [and] careless. We really focus on preventing that."

Lawler also added there is "absolutely" a benefit to having a team available for any infectious disease contingency because Ebola is not the only worry.

"There's [Middle East Respiratory syndrome] Coronavirus that's out there in the Middle East right now," said Lawler. "We've already had experience with SARS [severe acute respiratory syndrome] [and] with pandemic influenza, so the threat of emerging disease and pandemic disease is always out there."

Confidence in DoD Team

Lawler expressed confidence in the team's training and said he believes it's ready to deliver good care and to do it safely.

"I feel very comfortable that our training has prepared the team to deliver care effectively and safely," said Lawler. "If the event ever happens [where] the team gets called up, hopefully, other people [outside DoD] have the same confidence that I do that the team is ready to go."

Lawler added that the nation always turns to the military in difficult times, and it is up to the DoD team to ensure it lives up to that trust.

"I think, in general, doing good patient care in difficult situations is what the military medical system always does," said Lawler. "That mission is not unfamiliar to us and we're ready to go if the call comes around for this particular instance."



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Graphic illustration by Mikelle D. Smith, Naval Medical Research Center Public Affairs

NAMRU-3's Response to West African Ebola Epidemic

Story by Lt. Cmdr. Rhonda Lizewski, NAMRU-3

CAIRO - The ongoing outbreak of Ebola Virus Disease (EVD) in West Africa is the first in the region and largest outbreak ever recorded with over 12,400 cases and 4,800 deaths at the end of October.

The disease has overburdened already fragile public health and healthcare systems in the heavily affected countries of Guinea, Liberia, and Sierra Leone.

Operation United Assistance (OUA) is the U.S. Department of Defense outbreak response effort that includes a deployment of U.S. troops tasked with supporting the logistics of emergence equipment into the region, building Ebola Treatment Centers (ETC) and providing laboratory assistance.

Currently two teams from the Naval Medical Research Center are operating mobile laboratories in Liberia.

In November, the first of two U.S. Naval Medical Research Unit No. Three (NMRC-3) microbiologists will deploy in support of OUA.

In Egypt, NAMRU-3 has assisted the Ministry of Health and Population (MoHP) with EVD preparedness. Training has included "just-in-time assessments" workshops and training sessions at the Abbassia Fever Hospital, and a workshop for the World Health Organization (WHO).

Forty MoHP staff were provided the tools needed to make public health decisions for Egypt and the region.

The U.S. Navy and Centers for Disease Control and Prevention (CDC) experts, who work side-by-side at NAMRU-3, provided training in basic virology of Ebola, as well as the applied principles of infection control,



Egyptian Ministry of Health Ebola Mobile Response Team training. Dr. Emad Mohareb (left), Lt. Cmdr. Rhonda Lizewski (center) and Dr. Tamer Saeed (right) watch as Mustafa AbdelAziz demonstrates proper Personal Protective Equipment (PPE) donning techniques. (Photo courtesy of NAMRU-3 Public Affairs)

Sept. 2. After the seminar, the MoHP began honing its preparedness plan for Ebola.

They chose the Abbassia Fever Hospital as their Ebola Treatment Unit (ETU) should an Ebola case or suspected case arrive.

They needed assistance with assessing the ETU and their Personal Protective Equipment (PPE) protocols for infection control. NAMRU-3 staff members assessed the site and provided training to the Ebola Response Team and donated additional PPE to the hospital.

The training was such a success that NAMRU-3 then trained the MoHP Mobile Response Team; the highlight of which was the hands-on experience in donning and doffing PPE.

As a WHO Collaborating Center for Emerging Infectious Diseases, NAMRU-3 responded to WHO's request for training of laboratory and public health representatives in the region.

A three-day workshop for 11 participants from Jordan, Morocco, Lebanon, and Egypt was held October 28-30. The workshop included two days of educational seminars, followed by specific laboratory and PPE training on the third day. NAMRU-3's advanced diagnostic capabilities complement its training expertise.

The Virology and Zoonotic Disease Research Program is certified to test suspected clinical samples using the DoD RT-PCR Ebola diagnostic assay. NAMRU-3 is waiting designation as a WHO-designated reference laboratory for Ebola testing.

NAMRU-SA Leads a Multi-disciplinary Collaboration to Reduce Post-Surgical Infections

Story by Dr. Mauris N. DeSilva, NAMRU-SA Public Affairs



SAN ANTONIO -- Between 15 and 30 percent of battlefield wounds sustained in Iraq and Afghanistan involve the head and neck. Traumatic Head and Brain Injury (THBI) treatment often involves a craniotomy to remove damaged tissue and/or relieve intra-cranial pressure.

Follow-up craniotomy care typically includes cranial implant surgery to replace lost bone tissue. Cranioplasty outcomes are often complicated by serious postoperative infections and these infections are complex, difficult to treat, and can lead to the removal of the original implant.

All this is due to the accumulation of bacteria on the implant, and the formation of biofilms created by drug resistant bacteria –making post-cranioplasty infections a major concern for military medicine.

Researchers at Naval Medical Research Unit San Antonio (NAMRU-SA), Southwest Research Institute (SwRI), and Walter Reed National Military Medical

Center (WRNMMC) are collaborating with neurosurgeons, and oral and maxillofacial surgeons from San Antonio Military Medical Center (SAMMC) to design and develop novel cranial implants.

One implant project features a design that is driven by biomorphic topography that could reduce or even eliminate post-surgical infections in cranioplasty patients.

The topographic surface design utilizes a mathematical concept for developing biomaterial, where nanostructures manipulate the hydrodynamics on the surface of the implant preventing biofilms.

Nature has shown that topographical features on skin, such as with the fast-swimming shark, are capable of preventing bacteria from adhering to surfaces. In order to use topographic patterns as antiseptic mechanisms, the collaborators are working to determine if vortex particle entrapment can be reduced and therefore, reduce the risk of bacterial attachment and micro-fouling.

The team is combining simulation and experimentation to observe virtual biofilms interacting with mathematically generated structures, and then fabricate those structures for verification and characterization of nanostructures that are most resistant to *in-vivo* biofilm formation.

The NAMRU-SA researchers met with their industry collaborator October 25, to plan the next steps based on the initial modeling and experimental results.

NAMRU-SA's goal is to develop a protocol for fabricating an enhanced implant where post-surgical infection rates are reduced or eliminated.

The results will be relayed to the collaborating surgeons and engineers at Walter Reed National Military Medical Center, San Antonio Military Medical Center (neurosurgery and oral and maxillofacial surgery departments), and United States Air Force 59th Medical Wing, to fabricate new enhanced—infection resistant, titanium implants.

Laser-Induced Photo-Thermal Treatment Could Eradicate Antibiotic Resistant Bacteria

Story by Dr. Chase Watters, NAMRU-SA Public Affairs

SAN ANTONIO – The golden age of antibiotics is drawing to a close, as the development of new antibiotics diminishes and bacteria increasingly resist antimicrobial therapy.

The primary reason for this antibiotic resistance crisis comes down to time; it can take up to 20 years to develop an antimicrobial, while wide spread antibiotic resistance can develop in two years or less.

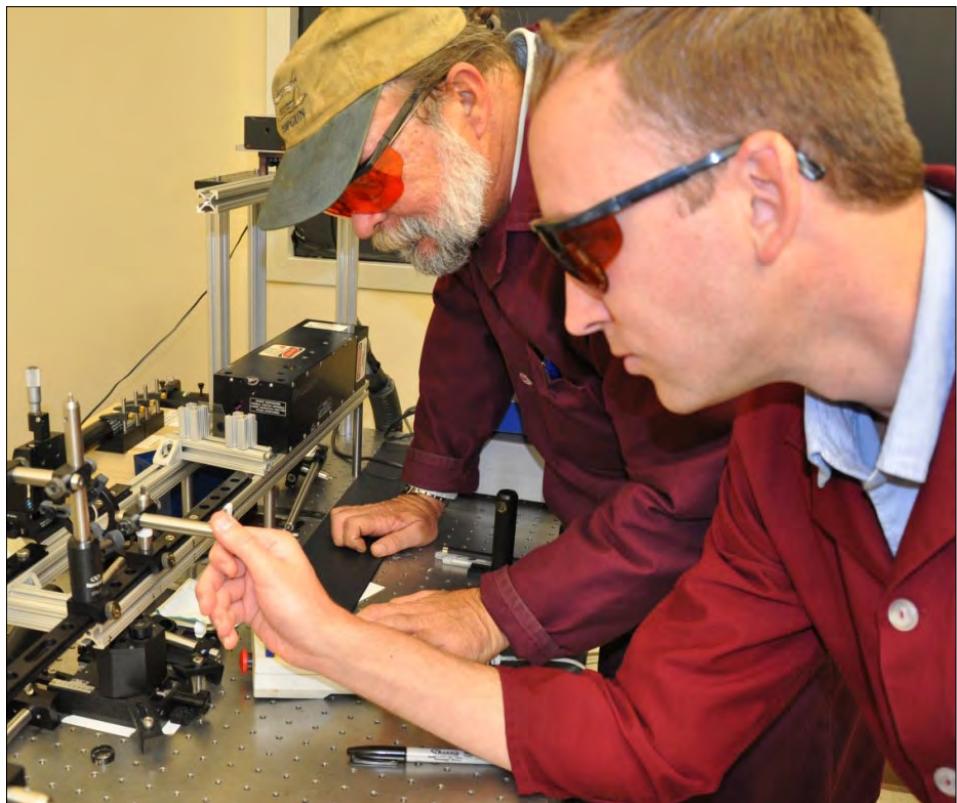
The rate of antibiotic resistance increases with the misuse of antibiotics such as when patients do not complete the full antibiotic regimen or when antibiotics are inappropriately prescribed for conditions like viral infections, on which antibiotics have no effect.

Antibiotic resistance in bacteria refers to transferable genetic mutations, which confer protection against antibiotics to future bacterial generations.

Along with conventional multi-drug resistant (MDR) microorganisms, the formation of bacterial biofilms poses a significant hindrance to the treatment of wound infections.

Biofilms can be thought of as bacterial cities, with a sugary coating that protects the bacteria from antibiotics and the immune system, similar to a wall garnering protection to a city.

An alternative way to counteract these antibiotic resistant bacteria and biofilms is with physical therapies like heat, light, and sound waves; where antibiotic resistance is overcome, the bacterial biofilm wall can be damaged, and worries of mechanical resistances are unlikely.



Dr. Chase Watters (front) and Mr. Norm Barsalou investigate how pulsed laser irradiation would maximize bacterial biofilm destruction. (Photo courtesy of NAMRU-SA Public Affairs)

This strategy is being pursued by researchers at the Naval Medical Research Unit San Antonio (NAMRU-SA) with pulsed laser irradiation combined with targeted energy absorbing nanoparticles for multi-drug-resistant *Staphylococcus aureus* (MDRSA).

S. aureus is one of the leading causes of infections in deployed personnel, and a prime research target.

Researchers, working in the Craniofacial Health and Restorative Medicine Directorate, hope this will significantly decrease the viability of the bacteria in planktonic and biofilm forms via the generation of “nano-explosions” that cause physical

damage to the bacterial cell and the biofilm matrix.

This approach could prove effective at eradicating pathogens, regardless of their level of antibiotic resistance. If successful, this new treatment regime will give health care providers an alternative, non-pharmaceutical approach to treating combat wounds.

The on-going research at NAMRU-SA hopes to better protect the warfighter in the future from the challenges of fighting MDR infections, by packing a laser filled-punch against numerous antibiotic resistant bacteria.

NAMRU-D Flight Simulations Reduce Pilot Spatial Disorientation

Story by Henry P Williams, Ph.D., Naval Medical Research Unit – Dayton



U.S. Navy flight demonstration squadron, the Blue Angels, pilots render a salute after the team's first demonstration of 2014 at the Naval Air Facility El Centro Air Show. The Blue Angels are scheduled to perform 68 demonstrations at 34 locations across the U.S. in 2014.
(U.S. Navy photo by Mass Communication Specialist 2nd Class Andrea Perez/Released)

DAYTON, Ohio - Spatial Disorientation (SD) is an aviator's misperception of the attitude, position, or motion of his/her aircraft relative to the Earth's surface and gravitational vertical. SD is a serious threat to flight safety and is the leading aeromedical cause of Class A mishaps in Naval aviation. SD is also a leading killer across the DoD and in civilian aviation as well.

The Naval Medical Research Unit – Dayton's (NAMRU-D) Aeromedical Directorate is on a mission to counter this threat by developing, validating, and upgrading simulator-based SD recognition and avoidance training scenarios and supporting courseware. Within the last year NAMRU-D SD researchers completed two studies involving a total of 38 pilots and four different flight scenarios. This work was sponsored by NAVAIR PMA-205 (Aviation Training Systems) and the Defense Health Program.

Two of those scenarios addressed the Black Hole Illusion (BHI) and Control Reversal Error (CRE). The BHI is a form of SD that can occur during night

approaches to runways in visually sparse environments. With few depth cues, pilots often feel they are too high and erroneously descend to a lower, shallower approach path. If unlit high terrain or obstacles are near the approach path the results can be fatal.

To determine if the BHI could be reliably created in a simulator, the SD lab developed day and night landing scenarios, and a short six-minute training video explaining BHI and how to deal with it.

In daytime conditions participants flew near perfect approaches, but in night scenarios 92 percent of them flew significantly low BHI approaches.

On average they were 148 feet too low when only 1.5 nautical miles (nm) from the runway. After watching the training video, the night approach deviation (148 feet) was reduced to just three feet!

In the same study, pilots flew the CRE scenario in which they followed a lead aircraft through a series of turns.

The lead flew into the clouds, continued its turns and eventually disappeared, forcing the participant to transition to instruments and recover from the turn. During the recoveries 23 percent of the pilots committed at least one CRE by initially turning in the wrong direction, steepening the angle of bank.

This error can be extremely dangerous in actual instrument flight, leading to incapacitating SD and a fatal departure from controlled flight. Exposing pilots to these situations in the safety of a simulator can help them avoid the danger in the air. As a result of the SD research findings, NAMRU-D has transitioned the developed simulation and training courseware products to the Naval Survival Training Institute (NSTI). A Navy Medicine function, as executed in part by NSTI, is to provide aircrew didactic instruction on how to recognize and avoid the threat of SD.

In this way, researchers at NAMRU-D are directly contributing to mission effectiveness, aviation mishap prevention, safety and survivability of the Fleet.

German Navy Surgeon General Visits NAMRU-SA

Story by Flisa Stevenson, NAMRU-SA Public Affairs



Diagnosing potential dental problems is vital to mission readiness. Cmdr. David Leal in NAMRU-SA's Craniofacial Health and Restorative Medicine Directorate, demonstrates a laser device adapted by biomaterials researchers, that shows dentists subtle discrepancies and cracks in a tooth that can't be seen by doing a regular dental exam. (Photo courtesy of NAMRU-SA Public Affairs)

SAN ANTONIO — The German Navy's senior medical officer visited the Naval Medical Research Unit San Antonio's (NAMRU-SA) biomedical facilities during a cross-country tour of U.S. Navy Medicine Education and Training operations, Oct. 23.

Rear Admiral Hans Wolfgang von der Heide-Kattwinkel, Surgeon General of the German Navy, in his first visit to NAMRU-SA, received a brief on the command's scope and research capabilities before touring the Combat Casualty Care (CCC&OM) and Operational Medicine, and Craniofacial Health and Restorative Medicine (CH&RM) Directorates, the key research arenas for NAMRU-SA.

The visitors heard presentations by

representatives from each directorate discussing the innovative research underway at NAMRU-SA.

Dr. John Simecek, acting director of CCC&OM, began the tour at the Tri-Services Research Laboratory, where Navy scientists test and evaluate hemorrhage control and resuscitative agents, including *in-vitro* and *in-vivo* evaluation; synthetic cadavers (Syndavers), and HapMed Tourniquet training mannequins.

Cmdr. Forest Sheppard, surgeon and head of Expeditionary and Trauma Medicine Department explained, "Hemorrhage remains the leading cause of potentially survivable casualty deaths, and we are investigating what pharmaceutical

agents will be most beneficial to military casualties."

NAMRU-SA is at the forefront in developing a model to facilitate the development and meaningful evaluation of human-derived therapeutics for uncontrolled severe hemorrhage.

"No one else is doing what we are doing," said Sheppard.

The tour continued at NAMRU-SA laboratories at the Battlefield Health and Trauma Research Institute, where the visitors met representatives from the CH&RM Directorate to learn about core capabilities and current research underway in preventive

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NAMRU-6 and NMRC Cooperate in Searching for Phages

Story courtesy of NAMRU-6 Public Affairs



Taking sample from Rimac River, Lima, Peru. (Photo courtesy of NAMRU-6 Public Affairs)

LIMA, Peru - Emergence of multidrug resistance organisms (MDRO) worldwide is a major public health threat.

The indiscriminate use of antibiotics has led to evolutionary pressure on pathogens to develop resistance to common antimicrobials that is spreading around the globe.

Current drug options to treat patients infected with MDROs are increasingly scarce and very little progress has been made to develop novel antibiotics to combat MDROs.

The Phage

Bacteriophages are viruses that infect, replicate, and kill bacteria. They were well described since the early 20th century, but with the discovery

of antibiotics further research was abandoned by western countries in the 1930s.

With the rapid rate of increasing resistant bacteria, there is increased interest to develop alternative diagnostic tools and therapy for MDROs.

Development of a Bacteriophage Library for Future Diagnostics and Treatment

With the support from the Armed Forces Health Surveillance Center- Global Emerging Infections Surveillance (AFHSC-GEIS), the U.S. Naval Medical Research Unit No. Six (NAMRU-6) in collaboration with the Naval Medical Research Center (NMRC) and an industry partner, currently working together to develop

a library of bacteriophages capable of targeted killing of specific pathogenic bacteria.

Given that phage susceptibilities vary based on geographical location, the overall goal is to collect phages from multiple sites globally to develop phage cocktails with activity against a broad range of MDROs.

Specifically in Peru, researchers are isolating, identifying and characterizing bacteriophages from environmental sources which will be used in the development phage detection and diagnostic platforms.

The industry partner has developed a phage diagnostic product which is designed to create a novel nucleic acid, the Surrogate Marker Locus

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R&D Chronicles

Navy Medicine's Scientific Foundation

The Development of the Navy Medical Laboratory School of Instruction

Part II

By Andre B. Sobosinski, Historian, Bureau of Medicine and Surgery

"Life on board ship is not conducive to habits of study and its offers few advantages for the prosecution of research by exact methods."

~Medical Director Samuel Coues, USN to first class of School of Instruction, 1878

The development of bacteriology and the birth of public health movements in the late nineteenth century would go far to reshape our understanding of disease and the means of disease prevention.

This new age of medicine would also help remold the role of the Navy physician. The Navy physician travelling the oceans in the age of sail was now the "Scientist-Physician" charting the unexplored territories of sanitary science through chemical, bacteriological, and microscopic investigations. By the 1870s, physicians seeking commissions in the Navy,

and those seeking promotion within service, had to show an aptitude in laboratory science before the Navy's Medical Examining Board.

On February 1, 1878, in order to better prepare candidates for this examination, Navy Surgeon General William Grier authorized the formation of the "Laboratory School of Instruction" (sometimes called the Department of Instruction) at Naval Hospital Brooklyn, N.Y. Naval Hospital Brooklyn was every bit a forebear of today's multifunctional medical centers.

In addition to being one of the largest hospitals in the Navy at the time, it served as the home to the Medical Examining Board and the Naval Laboratory—an in-house pharmaceutical/medical supply depot that both manufactured and supplied the Navy with all of its medicines and surgical equipment.

Students at the new school would have access to all of the hospital's resources, including quarters and mess. And upon graduation, they would stand before the board for examination.

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Guest Researcher begins Fellowship in NMRC's Undersea Medicine Department

Story by Mikelle D. Smith, Naval Medical Research Center Public Affairs



Guest Researcher, Lt. Kari Wagner (center), with her mentors, Naval Medical Research Center (NMRC) researcher Dr. Aaron Hall (left) and Operational Undersea Medicine Department (OUMD) Head Capt. David Regis (right), in an OUMD laboratory at NMRC. Wagner is fulfilling a 1.5 year fellowship at NMRC. The Fellowship is part of a three-year Neonatal-Perinatal Medicine program at Walter Reed National Military Medical Center. (Photo taken by Mikelle D. Smith, Naval Medical Research Center Public Affairs)

SILVER SPRING, Md., -- A guest researcher from the Walter Reed National Military Medical Center (WRNMMC) began a fellowship in the Naval Medical Research Center's (NMRC) Operational Undersea Medicine Department (OUMD) in August.

Lt. Kari Wagner, a general pediatrician with WRNMMC currently in her second year of a three-year Neonatal-Perinatal Medicine program to become a neonatologist, found out about the fellowship opportunity with NMRC through Capt. David Regis, OUMD department head.

"I know the program director for Dr. Wagner's Neonatology program, Air Force Col. Jay Kerecman," said Regis. "As well as being an undersea medicine officer, I am also a pediatric infectious disease specialist. Because of that experience, I knew there was

a lot of crossover from research we do in OUMD to potential issues in neonatology. I reached out to Col. Kerecman mentioning this crossover and let him know if he had fellows interested in coming over that would be great."

To finish her Neonatal-Perinatal Medicine program, Wagner is required to fulfill a research component by doing a fellowship.

"I interviewed at NIH [National Institute of Health], USUHS [Uniformed Services University of the Health Sciences] and NMRC. Based on my own benefits, I settled on picking this lab because of my interest in physiology ... in the NICU [Neonatal Intensive Care Unit] we think about physiology a lot when we are evaluating and treating newborns, and also the applicability to operational military life as well."

Wagner is currently involved in research efforts dealing with hyperoxia and its translation to Retinopathy of Prematurity in premature infants.

"The experiments that I am involved in deal with hyperoxia [high oxygen exposure] and the effects on the lungs in ways that we can measure that damage early or treat that damage. In the NICU many premature infants become exposed to too much oxygen, which can worry us so about things like Retinopathy of Prematurity. Retinopathy of Prematurity is basically damage to the blood vessels developing in the eyes, which is how Stevie Wonder became blind."

She will be working with OUMD researcher, Dr. Aaron Hall for the duration of her 1.5 year fellowship at NMRC.

NAMRU-6 and NMRC Cooperate in Searching for Phages

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(SML), which currently detects *Mycobacterium tuberculosis* and rifampin resistance from sputum.

With support from the Military Infectious Diseases Research Program, researchers are engineering a gene cassette which encodes the phage diagnostic product into cocktails of 4-5 phages which can infect a broad range of *Acinetobacter baumannii* and methicillin-resistant *Staphylococcus aureus* (MRSA) strains.

The potential therapeutic efficacy of the phage collection or “cocktail” generated from this project will be tested in a laboratory model which

will utilize an existing wound model at the Walter Reed Army Institute of Research and NMRC.

From September 22 to October 4, a team from NMRC and NAMRU-6 worked together to obtain Peruvian phages throughout Lima and Iquitos (a jungle city of Peru). Sewage water was collected from three hospitals in Lima and two in Iquitos and from open-air markets in Lima and Iquitos; one river in Lima and Iquitos each, and a sewage plant in Lima to isolate phages specific to *Acinetobacter baumannii*, an emerging problem in hospital-acquired infections and traumatic wound infections in military personnel.



NAMRU-6 team personnel, Nurse Miguel Lopez, taking sewage water sample at one military hospital.
(Photo courtesy of NAMRU-6 Public Affairs)

Navy Medicine's Scientific Foundation

The Development of the Navy Medical Laboratory School of Instruction

(continued from page 10)

The hospital's commanding officer, Medical Director Samuel F. Coues, USN—a physician of “well-known ability, acquirements, and zeal”—was placed in charge of developing the school's curriculum and served as the principal instructor.

Under his guidance students were required to go through an intensive regimen of lectures and laboratory work covering fields of recruit medicine, optics and microscopy, chemistry and chemical analyses, Navy regulations and procedures, and “naval hygiene” (a catch-all term covering everything from occupational medicine/public health to food science and nutrition).

Students were offered an opportunity to inspect naval vessels at the nearby shipyard for cleanliness, and

ventilation and where encouraged to attend clinics at local civilian hospitals to improve their knowledge of anatomy and dissection. Classes were held Monday through Saturday and each session lasted three months. Sessions were offered in September 1878, November 1878, February 1879, June 1879, and September 1879.

With Surgeon General Grier's retirement at the end of 1878 and Medical Director Coues transfer to Boston for “special duty” at the end of 1879, the school lost its two founders and ultimately ceased operation. The effort was rekindled briefly in the 1890s as the “Navy Laboratory and Department of Instruction” (1893-1898).

In May 1902, it was formally reestablished at Naval Museum of Hygiene in Washington, D.C. as the Naval Medical School.

Laboratory School of Instruction Curriculum

Partial Schedule of Second Class, Sept. 2-Nov. 2, 1878

The second class convened on Sept. 2, 1878 and consisted of nine assistant surgeons. The schedule of coursework included:

Microscopical Manipulation (Sept. 4-14)
History & Construction of the Microscope (Sept. 16 and Oct. 3)
Micrometry (Sept. 17 and 23-34)
Chemistry (Sept. 18-20)
Physical Examinations and Recruiting (Sept. 21 and 28)
Chemical Analysis (Sept. 25-26 and Sept. 30-Oct. 1)
Sphygmography (Sept. 27)
Food Science (Oct. 2)
Recruit Medicine/Myopia and Color Blindness (Oct. 5)
Analysis of Air (Oct. 7-9)
Section Cutting (Oct. 10)
Examination of Sputum (Oct. 11)
Temperature, Thermometer, & Humidity (Oct. 12)
Ventilation of Hospital (Oct. 16)
Microscopic Examination of Water (Oct. 16-17)
Antiseptic Dressing (Oct. 18)
Disinfection, Bilges, & Timber (Oct. 19)
Optics (Oct. 21-22 and 29-30)
Laryngoscopy (Oct. 23)
Physical Diagnosis of Diseases of the Chest (Oct. 24)
Navy Medical Forms of Regulations (Oct. 25)
Disinfectants, Cleanliness, Ventilation of Ships/Punishment, Prison, and prisoners (Oct. 26)
Medical Surveys and Pensions (Oct. 28)
Temperature (Oct. 31)
Otoscope (Nov. 1)
Quarantine, and Sanitary Regulations (Nov. 2)

NAMRU-D Environmental Health Effects Directorate to Kick-Off Two Funded Projects

Story by Brian A. Wong, PhD and Karen L. Mumy, PhD, NAMRU-Dayton



Aviation Boatswains Mate (Fuel) drags a JP-5 fuel hose after refueling an AH-1 Super Cobra helicopter on the flight deck of the forward-deployed amphibious transport dock ship USS Denver (LPD 9). (U.S. Navy photo by Mass Communication Specialist 3rd Class Casey H. Kyhl/Released)

DAYTON, Ohio - The Environmental Health Effects Directorate at the Naval Medical Research Unit Dayton (NAMRU-D) was selected by the Defense Medical Research and Development Program (DMRDP), Military Operational Medicine Joint Program Committee 5 (MOMJPC5) to conduct two projects in collaboration with the U.S. Air Force 711th Human Performance Wing/ Behavioral Systems (HPW/RHDJ), both studies will address very different health and safety concerns that span across the Department of Defense's military personnel.

The first of these two projects centers on the reported increases in adverse respiratory symptoms in personnel returning from deployment to Southwest Asia (SWA). Symptoms include diminished exercise tolerance due

to shortness of breath, eosinophilic pneumonia and constrictive bronchiolitis that have been attributed to exposure to events such as oil well and sulfur fires, particulate matter (PM) from dust storms, or to burn pits used to dispose of municipal solid waste (MSW).

A report commissioned by the Department of Veterans Affairs (VA) and generated by the Institute of Medicine concluded that the health effects resulting from mixed exposures to PM and combustion products from burn pits should be investigated.

In response, NAMRU-D proposed a toxicology study to investigate the potential health effects of exposure to airborne PM from SWA and to emissions from a model burn pit of MSW combustion.

A laboratory model was developed that would allow for exposure to the SWA PM alone, burn pit emissions alone, or to SWA PM and then burn pit emissions. Parameters of toxicity will be evaluated shortly after the last exposure and following periods of recovery. Changes in biomolecules will be measured to look for potential markers of exposure or toxicity and will provide a basis for similar biomarkers in humans.

The second project focuses on the neurophysiological effects of jet fuel exposure. Fuel exposure continues to pose a significant occupational hazard for military personnel. Certain occupational situations may result in short-term high level or long-term low level exposures to jet fuel, after which neurophysiological symptoms have been reported.

(continued on page 17)

Building a More Resilient Mind

Story by Dr. Karl F. Van Orden, Director of Research and Development at the Naval Health Research Center



Chief Aviation Boatswain's Mate (Handling) Steven Shinault prepares a training room prior to a firefighting drill at Surface Warfare Officer School for Fire Fighting and Damage Control Training at Fleet Activities Yokosuka, Japan. The school provides realistic firefighting training for Sailors and officers stationed at Fleet Activities Yokosuka. (U.S. Navy photo by Mass Communication Specialist 3rd Class Liam Kennedy/Released)

(This story is reprinted with permission from Future Forces Magazine, edited to fit newsletter format)

SAN DIEGO - Understanding psychological resilience—the ability to withstand, endure, and recover from stress—is the primary focus of scientists with the OptiBrain Center research consortium.

The center is a collaboration between the University of California, San Diego (UCSD); the Naval Health Research Center (NHRC), and the Naval Special Warfare Command. With support from the Office of Naval Research (ONR), researchers enrolled participants who viewed emotionally provocative stimuli and performed tasks under moderate stress levels while their brain activity was scanned

with functional magnetic resonance imaging (fMRI).

"We found significant differences in brain areas associated with the processing and regulating of information coming from the body," said UCSD researcher Dr. Martin Paulus. "The differences between elite and average individuals seem to be reliable over the course of several studies."

Along with well-known changes in stress hormones and performance decrements, the brain dynamics of resilience indicate very different stress response profiles between more and

less resilient individuals.

Both groups have an initial flood of stress hormones, as well as elevated heart rates and breathing rates associated with a stress encounter. More resilient individuals are able to harness the adrenaline rush to improve performance and then return to baseline levels much faster after stress than less resilient individuals. They may display lower anticipatory stress reactions. More resilient individuals are able to better control their reactions.

Such findings raise the nature/nurture

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Retired Deputy SG visits NAMRU-3

Story courtesy of NAMRU-3 Public Affairs



NAMRU-3's Gamal El Okla (right) shows samples of nematodes to Rear Adm. Mittelman (second from left) and Mrs. Mittelman (third from left) in the BPDRP Lab. (Photo courtesy of NAMRU-3 Public Affairs)

Retired Rear Adm. and former Deputy Surgeon General Michael H. Mittelman, along with his wife Tanis Mittelman, toured NAMRU-3 while visiting Egypt, September 11.

Rear Adm. Mittelman was excited to see NAMRU-3, a command which he

had followed closely while serving as the Deputy SG, but had not visited. In preparation for a visit with relatives in the region, he contacted NAMRU-3's Commanding Officer, Capt. John Gilstad and requested a chance to tour NAMRU-3.

"This was an outstanding opportunity to

show the admiral the positive impact his leadership as Deputy Surgeon General had had on our command," said Capt. Gilstad.

NAMRU-3's Lt. Joseph Diclaro II developed a comprehensive agenda and tour of the facilities. NAMRU-3's objective was to show Rear Admiral Mittelman how the unit functions and demonstrate the impact the unit has had on emerging infectious diseases in the region. Highlights of the visit included viewing sand fly colonies and mosquito specimens under the microscope within the Vector Biology Research Program and seeing tapeworms and other hematodes in the Bacterial and Parasitic Disease Research Program's specimen collection.

Rear Adm. Mittelman then took the time to hold an Admiral's Call for NAMRU-3's military members and took questions from the group. "He gave me great insights and perspective on the current vision of Navy medicine and what it means for my career development," commented Diclaro. During his discussion, Rear Adm. Mittelman mentioned that the overseas labs are on the front lines of global health efforts.

The visit ended with the wardroom inviting Rear Adm. Mittelman and Mrs. Mittelman to a lunch of traditional Egyptian "koshary."

**NAVAL MEDICAL RESEARCH CENTER WOULD LIKE TO WISH
THE UNITED STATES MARINE CORPS HAPPY 239TH BIRTHDAY!**



Graphic illustration by Mikelle D. Smith, Naval Medical Research Center Public Affairs

German Navy Surgeon General Visits NAMRU-SA

(continued from page 8)

dental care, novel wound healing dressings, and multi-drug resistant infection control. Scientists described studies using surface enhanced Raman spectroscopy to identify bacteria and viruses in blood.

The technology can also be used

to differentiate between antibiotic-resistant bacteria from any part of the body. The tour concluded with additional presentations from the CCC&OM Directorate discussing new studies in molecular biology and immunology based assay research to better understand the body's reaction to trauma.

Von der Heide-Kattwinkel said he was absolutely impressed with the depth and breadth of the research being conducted at NAMRU-SA.

The scientists are proud of what they do here and the passion and commitment was evident from each person he met.

Building a More Resilient Mind

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question. Are some individuals born with greater resilience, or is it learned?

Dr. Douglas Johnson of NHRC studied the effects of mind/body mindfulness training on pre-deploying Marines.

Mindfulness training in this study included 20 hours of classroom instruction plus daily homework exercises over an eight-week period.

The exercises involved attending to internal states, focused attention, and tolerance of present-moment tasks.

Previous studies have shown practicing various forms of meditation can enlarge some brain centers, indicating greater neural growth and change.

Johnson measured biomarkers, brain activity, cognitive performance, and self-reported sleep quantity and quality in 281 Marines, 147 received the mindfulness training.

The results, reported in the August 2014 issue of the American Journal of Psychiatry, indicated those Marines who underwent mindfulness training had a more robust stress reaction to an intense pre-deployment training exercise, as measured by heart rate.

A more efficient recovery, as measured by heart rate, breathing rate, and stress

hormone measures as compared with untrained Marines. The mindfulness-trained Marines demonstrated lower brain activity in key brain areas when challenged with a moderately stressful, restricted breathing task, based on individual fMRIs.

"Our measures are comprehensive, but there's more work to be done," said Johnson. "There may be other forms of training that are effective, and we don't yet know about longer-term mental health outcomes."

Johnson and his team are conducting a more rigorous follow-on study in Marines undergoing basic reconnaissance training, using an even larger suite of measures that includes operational tasks that measure training effectiveness. These results will be applicable to numerous military communities.

"This research is both allowing us to better understand the underpinnings of resilience within our operators and to apply and implement the findings within our programs," said Cmdr. Eric Potterat, force psychologist with Naval Special Warfare Command.

Although military experience and mindfulness training indicate that some level of resilience can be learned, the role of genetics and basic neurobiological traits cannot be overlooked.

Dr. Marc Taylor of NHRC is studying variations in specific serotonin and corticosteroid receptor genes in humans that may be related to acute and chronic stress reactions.

These genes work to regulate stress hormone control systems. His study of 144 military men completing a strenuous survival and captivity training course found the gene combinations result in distinct groups defined by high, medium, and low stress buffering capacities.

Stress buffering works to protect and regulate the body and arousal systems from the deleterious effects of high-stress hormone levels. In highly resilient individuals, peripheral mechanisms interact with central brain systems to regulate, and even exploit, acute stress responses, and more efficiently return to baseline levels following stress. Less resilient individuals have system components that operate with far less efficiency.

Taylor's group hopes to modulate the action of these genes with nutritional supplements or other means and, in effect, give a greater percentage of individuals a neurobiological head start in the resilience building domain.

There remain significant challenges to building more resilient minds in service members.

Researcher Talks Bats at the Annual American Society for Tropical Medicine and Hygiene Meeting

Story by Doris Ryan, Naval Medical Research Center Public Affairs

SILVER SPRING, Md. – A researcher working at the Naval Medical Research Center (NMRC) was invited to talk about genomic studies of bats at the Annual American Society for Tropical Medicine and Hygiene Meeting, in New Orleans, Nov 5.

Dr. Kimberly A. Bishop-Lilly, a Henry M. Jackson Foundation contractor who works in the NMRC Biological Defense Research Directorate, first spoke about bats and their unique viral immunity and later participated in a panel discussion taking questions from the audience on a variety of aspects related to bats, including bats as viral reservoirs.

Bats are now widely recognized as being reservoirs for a number of viruses including some of which are very pathogenic to humans and other mammals, such as the Henipaviruses, SARS-like Coronavirus, and potentially Ebola and Marburg viruses.

“We want to understand what animals serve as reservoirs for viruses, which will allow us to better control and

prevent human disease, and protect our warfighters,” said Bishop-Lilly. She also added that researchers are interested in understanding more about bat biology to identify what the stressors are that influence spill-over from animal populations to human populations.

Expanding comparative genomics and understanding the relationship of those finds to immunology may one day help researchers to engineer an antiviral strategy for humans, what Bishop-Lilly called the holy grail of a bat inspired antiviral.

“Bats are amazing in a number of ways,” said Bishop-Lilly, who has studied bats for 12 years. “First of all, they are the only mammals that have evolved a way to fly – the most energetically expensive means of locomotion. They are very numerous and have very diverse traits and habitats. Additionally, it appears, there may be differences between the way their innate immune systems handle viruses as compared to the way other mammals do, including ourselves.”

In her presentation, Bishop-Lilly reviewed the current work related to genomics work in bats such as genome sequencing, transcriptome studies, proteome work, and metagenomic sequencing. She discussed the results from the NMRC Science paper (<http://www.sciencemag.org/content/339/6118/456.long>) published in December 2012, which reflected the work of an international team of researchers.

“Specifically, evolving to fly may have required compensating for the toxic byproducts of increased metabolism, and that, in turn, had collateral effects on their innate immunity.”

NMRC is the headquarters for Navy Medicine’s research and development enterprise that includes the NMRC laboratory and affiliated laboratories in the U.S. and overseas.

The NMRC laboratory’s research focuses on infectious disease vaccine development, operational and undersea medicine, bone marrow research and registry, and biological defense.

NAMRU-D Environmental Health Effects Directorate to Kick-Off Two Funded Projects

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Poor coordination, memory deficits, and impairments in attention-based tasks have been reported following exposure to Jet Propulsion (JP)-5 and -8 fuels.

Previous studies demonstrated changes in behavioral responses, although the changes were inconsistent, making it difficult to formulate a conclusion

regarding the effects of jet biofuel exposure on the nervous system.

NAMRU-D was awarded funding to specifically study the potential neurotoxicity associated with exposure to JP-5, JP-8, the commercial jet fuel Jet A, and one alternative jet fuel.

Using a laboratory model, following exposure, neurological function will

be assessed through behavioral testing, neuro-electrophysiology testing of brain activity protein/small molecule changes within the brain and cytokine and microRNA profiles.

All measurements will be correlated with the neurological assessments.

NAMRU-6 and DIMO Provide Training to Peruvian Military Hospitals

Story courtesy of NAMRU-6 Public Affairs



Participants of the NAMRU-6 workshop on Infection Control in collaboration with the Defense Institute of Medical Operations (DIMO) take a pre-test. The workshops were taught by the DIMO Mobile Education Team and the Peruvian Army. (Photo courtesy of NAMRU-6 Public Affairs)

LIMA, Peru - Hospital-acquired infections (HACs) remain a major public health threat in both the industrialized and developing world.

The evolutionary pressure exerted upon bacteria by the uncontrolled use of antibiotics has led to widespread resistance, complicating effective control of these infections and increasing patient mortality. The U.S. Naval Medical Research Unit No. Six (NAMRU-6) in collaboration with the Defense Institute for Medical Operations (DIMO) developed a workshop on Infection Control taught by the DIMO Mobile Education Team and the Peruvian Army.

The main goal of the workshop was to assist Peruvian military hospitals in developing an effective infection control program that emphasized prevention of wound infections.

This was the first international workshop for hospital infection control management developed and delivered by senior Peruvian military healthcare providers.

The workshop involved instruction on the skills to perform situation analysis, needs assessment, and goal setting to supplement and enhance current infection control programs and develop leadership in infection control program management in Peruvian military personnel.

The course was held at the Peruvian Army Hospital, Hospital Military Central, September 8-12, 2014, with support from personnel of COSALE (Comando de Salud del Ejercito).

Dr. Matthew Dolan from DIMO led a team of two infectious diseases specialists and two infection control

officers. The course included reviews of operating rooms, ICU, obstetrics, medical and surgical wards, central sterilization, and the microbiology laboratory. The course was attended by 58 physicians, nurses, and laboratory staff from three different installations; including 44 from the Peruvian Army hospital in Lima, Peru; five from the Air Force Hospital, and five from Navy Hospital.

DIMO is a dual service agency comprise of U.S. Air Force and Navy personnel committed to providing world class, regionally-focused, healthcare education and training to partners around the world.

DIMO is a small facilitating agency that utilizes subject matter experts throughout the DoD to develop curriculum and teach courses around the world.

NAMRU-3 Participates in World Health Organization Workshop in Oman

Story courtesy of NAMRU-3 Public Affairs



Dr. Ahmed Farid (seated center) from WHO Afghanistan, volunteered to have samples collected from him for the trainees to learn nasopharyngeal and oropharyngeal swab collection. Dr. Mayar Said (right) demonstrates the procedure. (Photo taken by Lt. Cmdr. Gabriel Defang)

CAIRO – The U.S. Naval Medical Research Unit No. Three (NAMRU-3) serves as the World Health Organization (WHO) Reference Laboratory for Emerging Infections in the Eastern Mediterranean Region.

Two staff members from NAMRU-3 participated in a workshop organized by WHO and the Ministry of Health in Muscat, Oman, Sept 14 – 18. The workshop title was “In-Country Rapid Response Teams on Field Investigation to Respiratory Outbreak Caused by a Novel Virus.”

Lt. Cmdr. Gabriel Defang, head, Virology and Zoonotic Disease Research Program (VZDRP), and Dr. Mayar Said, head of the VZDRP Diagnostics Unit and the Molecular CAP laboratory, conducted the laboratory session of the workshop.

Their aim was to help the participants identify the role of the laboratory during respiratory outbreak investigations, the proper personal protective equipment

(PPE) needed, and the type of samples required for testing based on the signs and symptoms. They also discussed how samples should be stored, packaged and shipped to testing and reference labs in order to identify the etiology of the outbreak.

“The trainees chose the NAMRU-3 presentation as the most interesting and useful at the end of workshop evaluation,” said Said, who was impressed by the participants.

The workshop was attended by epidemiologists from ministries of health in the Eastern Mediterranean Region including Egypt, Sudan, Pakistan, Lebanon, Afghanistan and Oman. Epidemiologists Dr. Brian Rha, Non Influenza Division, and Dr. Fiona Havers, Influenza Division, Centers for Disease Control and Prevention (CDC) Atlanta also participated in the workshop. Defang discussed the field assays that could be used during an outbreak investigation and the use of portable equipment for

rapid identification of known respiratory pathogens.

Said demonstrated donning and doffing of the personal protection equipment (PPE), nasopharyngeal and oropharyngeal swab collection, and showed examples of sample collection kits and triple packaging of samples for shipment to a reference laboratory. WHO filmed the NAMRU-3 practical session to be used for future trainees.

At the request of the Ministry of Health of Oman, Defang and Said made an assessment visit at the Central Public Health Laboratory (CPHL). CPHL Oman’s Dr. Salah El Audi asked NAMRU-3 for advice on how to test and ship samples. Defang and Said conducted a short training session for the CPHL lab staff on PPE. Said had previously conducted an assessment visit at CPHL Oman in December 2012, to troubleshoot technical problems in testing influenza for the Severe Acute Respiratory Infection (SARI) surveillance.

NMRC CO Talks to Silver Spring Community about the Navy Medicine R&D Enterprise

Story by Doris Ryan, Naval Medical Research Center Public Affairs

SILVER SPRING, Md. – Capt. John W. Sanders, commanding officer of the Navy Medical Research Center, lead the discussion at the National Museum of Health and Medicine's Science Café at the Silver Spring Civic Building, October 28.

The topics he discussed included research in infectious diseases, biological defense, combat casualty care, military operational and expeditionary medicine, and bone marrow transplantation.

Sanders provided an overview of the eight laboratories that make up the Navy Medicine R&D Enterprise and highlights into the latest Navy Medicine research and development contributions to the global health community.

He reached back into history and told the audience about the achievements of Cmdr. Robert A. Phillips, a research scientist during World War II whose research led to a cure for cholera.

Sander's said it was through Phillip's research that the ability to measure electrolytes and replace fluids appropriately was discovered.

The oral rehydration salts would go on to save millions of people and earned Phillips the Laskar Award, as well as other numerous awards.

Sanders added historical points about Harry Hoogstraal, an American entomologist and parasitologist, who is regarded as the world's foremost expert on ticks and tick-borne diseases.

Sanders ended his presentation by discussing NMRC's support for DoD's participation in Operation United Assistance with the deployment of two mobile detection laboratories to Liberia.

Using samples of patient's blood provided by the Ebola Treatment Units staff members and health care providers, the labs can detect the presence of the virus.



Capt. John W. Sanders, commanding officer of the Naval Medical Research Center, takes a question during the National Museum of Health and Medicine's monthly Medical Museum Science Café, held Oct. 28 at the Silver Spring Civil Building. (Photo taken by Doris Ryan, Naval Medical Research Center Public Affairs)



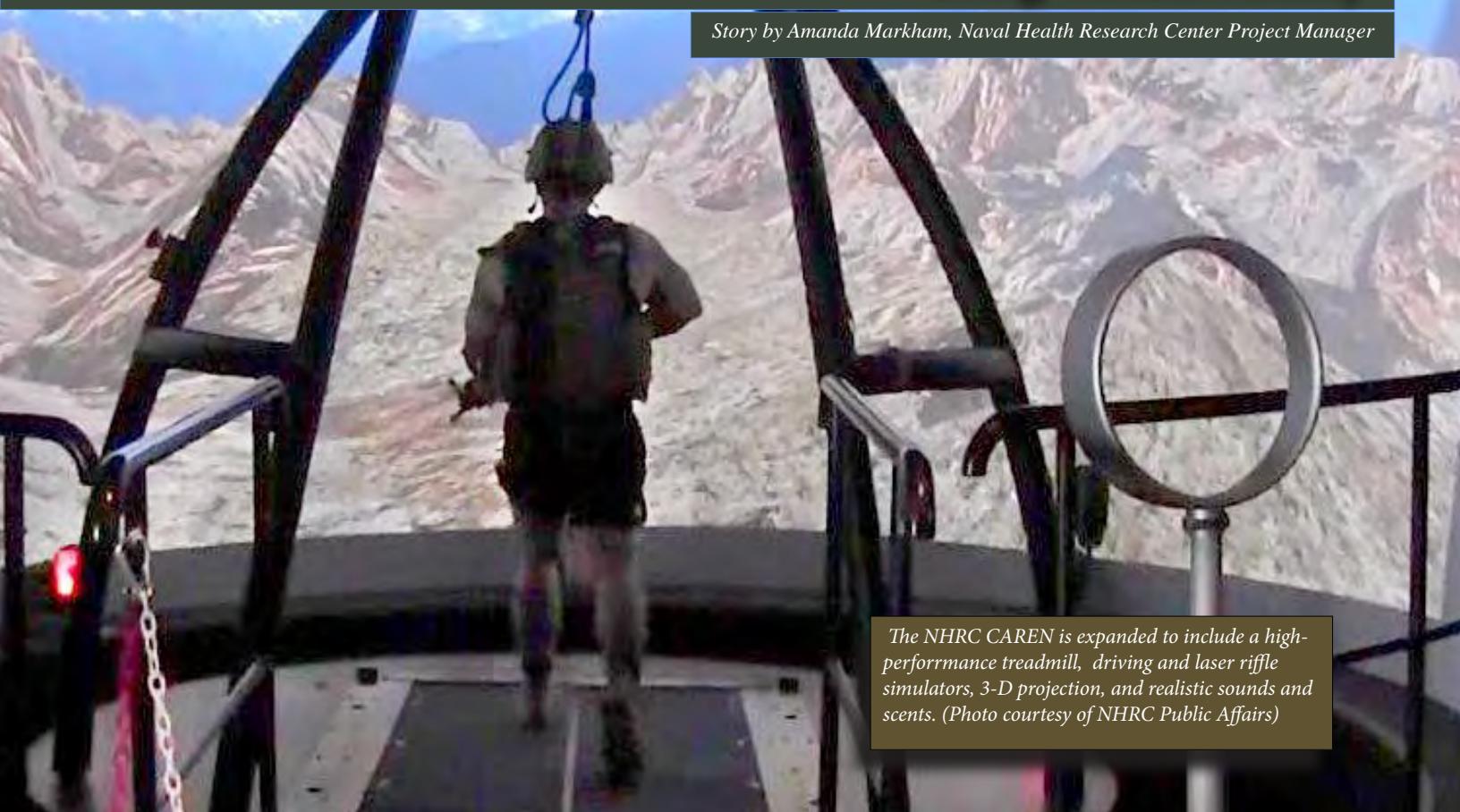
The labs' detection capabilities have reduced the time it takes to determine whether a patient has Ebola or not from several days to less than 24 hours, but usually within 4 – 7 hours.

After the presentation the audience had the opportunity to ask questions, meet Sanders and continue the discussion until the close of the Café.

Capt. John W. Sanders, commanding officer of the Naval Medical Research Center, speaks with an interested participant after his speech at the National Museum of Health and Medicine's monthly Medical Museum Science Café, held Oct. 28 at the Silver Spring Civil Building. (Photo taken by Doris Ryan, Naval Medical Research Center Public Affairs)

Assessing Warfighter Physical and Cognitive Performance Using Virtual Reality

Story by Amanda Markham, Naval Health Research Center Project Manager



The NHRC CAREN is expanded to include a high-performance treadmill, driving and laser rifle simulators, 3-D projection, and realistic sounds and scents. (Photo courtesy of NHRC Public Affairs)

SAN DIEGO - To the wounded warrior, participating in a virtual task at the Naval Health Research Center's Physical and Cognitive Operational Research Environment (PhyCORE), may just seem like playing a big video game.

However, this unique environment provides researchers and clinicians with the capability to conduct training and validation of physical and cognitive training programs for rehabilitation of wounded warriors with a high degree of scientific and clinical accuracy, while keeping the patient engaged and enthusiastic about their recovery.

The immersive virtual environment at the PhyCORE laboratory is a novel and effective means to support research and clinical studies that aim to understand and assess physical and cognitive performance factors of the warfighters.

Researchers at NHRC are using novel

immersive virtual environments like the PhyCORE, in addition to smaller virtual reality systems, and conventional clinical and laboratory tools to understand physical and cognitive performance in the healthy and injured warfighter with the goal to improve programs and techniques for wounded warrior rehabilitation.

The PhyCORE, which uses a Computer Assisted Rehabilitation Environment (CAREN) and additional immersion capabilities to create a realistic virtual environment can visually imitate any environmental scene such as an Afghanistan mountain range or a bustling city street.

The CAREN is a unique, technologically advanced, multifunctional system which includes a 6-degrees-of-freedom motion platform, 16 optical cameras for 3D motion capture, a dual-belt treadmill, embedded force plates, and a 180-degree 10-foot-tall panoramic screen.

The NHRC CAREN is expanded beyond many other CAREN systems to include a high-performance treadmill, incorporated driving and laser rifle simulators, 3-D projection, and realistic sounds and scents.

It is all of these components working simultaneously that create lifelike virtual scenarios for the patient and the state-of-the-art clinical research laboratory for the PhyCORE team.

Current clinical work in the PhyCORE includes assessment of rehabilitation training programs for the wounded warrior such as using the CAREN for vestibular physical therapy. After a six-week training program on the CAREN, vestibular patients show improvement in CAREN-based functional tests and in traditional clinical tests for dizziness, balance, and gait.

In other work, outcomes of a two-week

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Leaders from the American Dental Association Tour NAMRU-SA Dental Research Operations

Story by Flisa Stevenson, NAMRU-SA Public Affairs



Capt. Jonathan Stahl (front, left), head of NAMRU-SA's Maxillofacial Injury and Disease Dept, under the Craniofacial Health and Restorative Medicine Directorate welcomes American and Canadian Dental Association leaders to NAMRU-SA facilities; as American Dental Association President-elect Maxine Feinberg (second from right) and the group listens to his overview of NAMRU-SA's research projects involving cooperative work with other military branches. (Photo courtesy of NAMRU-SA Public Affairs)

SAN ANTONIO --In the spirit of collaboration, Naval Medical Research Unit – San Antonio’s (NAMRU-SA) Craniofacial Health and Restorative Medicine (CH&RM) researchers joined with officers from U.S. Army, Navy and Air Force Dental Corps to welcome leaders from the American Dental Association (ADA) and the Canadian Dental Association (CDA) to Joint Base San Antonio - Fort Sam Houston for a tour of the state of the research science in dental, October 8.

ADA President Charles Norman, President-elect Maxine Feinberg, Executive Director Kathleen O’Loughlin, Dr. Marshall Gallant of the VA Medical Center in Orlando, FL., and several leaders from the Canadian Dental Association and the Canadian Forces Dental Services; spent a half-day touring, Brook Army Medical Center Oral and Maxillofacial

Surgery Clinic, the Institute for Surgical Research, and NAMRU-SA --on the day before the opening of the ADA 2014 –America’s annual dental meeting.

Capt. Jonathan Stahl, head of Maxillofacial Injury and Disease Dept, under the CH&RM Directorate, led the delegation and welcomed the visitors to NAMRU-SA.

Navy scientists showcased some of the innovative research in preventive dental care, novel wound healing bandages, and infection control.

Visitors learned about the adaptation of a laser-based device known as an optical coherence tomography that will allow dentists to see subtle discrepancies and cracks in a tooth that are unable to be detected during a regular dental exam.

Stahl talked about the lab’s electrospinner device and the development of a novel wound dressing that will improve the rate of wound healing and reduce scar formation of wounds.

The group saw a device NAMRU-SA researchers are evaluating called surface enhanced Raman spectroscopy, which can provide medics with a tool to quickly identify dangerous bacteria and viruses.

Scientists are hoping this tool can identify specific bacteria in as little as 15 seconds and help complete the prep and identification process in as little as fifteen minutes.

The ADA and CDA leaders also learned that the Navy is at the forefront of efforts to minimize the release of dental wastewater contaminants into the environment with a study focused on the development of an improved chairside amalgam separator.

NAMRU-SA showcased ongoing research to develop and patent new devices that help ensure servicemen and women get the best medical care possible.

In this tour ADA and CDA visitors learned how improving dental readiness could significantly increase individual medical readiness and enhance the health, safety, performance, and operational readiness of Navy and Marines personnel.

Cognitive Performance Using Virtual Reality

(continued from page 21)

clinical-based fall-prevention program are being assessed on the CAREN, and patients with lower-limb amputation are showing significant improvement in their ability to prevent a fall, increased confidence in their prostheses, and increased confidence with activities of daily living. Patients are retaining these outcomes three and six months following training.

Additional work related to the warfighter in the PhyCORE has assessed the performance of warfighters wearing different personal protective equipment.

The PhyCORE research team is also one of the first groups to establish norms describing how healthy individuals perform in the CAREN. Preliminary results from this work suggest that multi-tasking training programs conducted in the PhyCORE lead to improvements in both physical and cognitive performance of injured populations. Future work for the PhyCORE team will continue to develop and assess rehabilitation programs for the wounded warrior and training programs for the healthy warfighter.

PhyCORE researchers also plan to transition the lessons learned within the virtual system to the clinic or the field to reduce rehabilitation times and improve outcomes for the wounded warrior and provide performance feedback measurements to help the healthy warfighter.

Greetings from the NMRC Ombudsman!

With the holiday season upon us, I'm sure many of you will be traveling to visit family and friends. This is one of the more dangerous times to travel between the volume of traffic on the roads and the unpredictable winter weather. Here are some tips for safe travel:

Always Travel during Daylight Hours.

Tired or distracted driving is as dangerous as driving under the influence.

Don't Count on Consistent Cell Phone Service.

Be sure to travel with an atlas map and key phone numbers either written down or memorized.

Be Aware of Drivers on the Road.

Just because you know the route doesn't mean they do too.

Service your Vehicle before Road Trips.

At a minimum, make sure to get an oil change, tire pressure check, and keep your gas tank half full to avoid gas-line freezes.

Pack an Emergency Travel Kit.

Include blankets, gloves, hats, a flashlight,

extra batteries, snacks (maybe an MRE or two), water bottles, sturdy walking shoes, and a refillable gas canister.

Move slowly when driving on Snow or Ice.

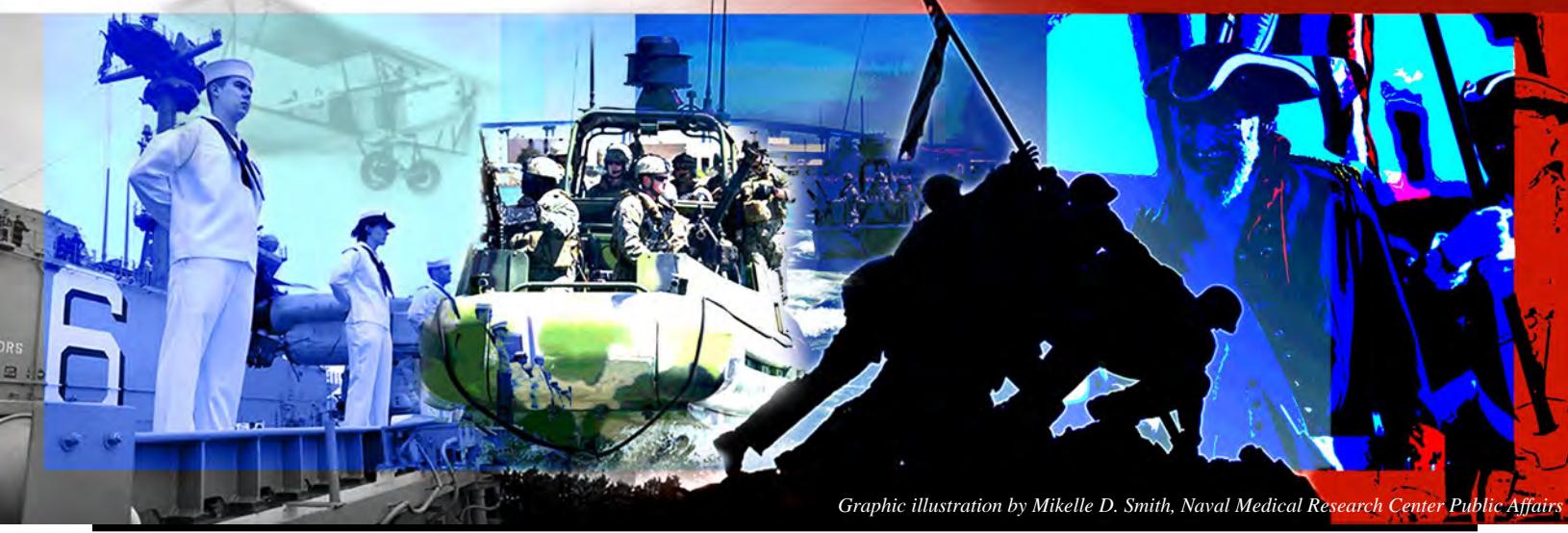
Black ice can be dangerous and you won't be able to see it. Before you travel, make sure you know how to steer out of a skid. For some good pointers, check out AAA's "How to Go on Ice and Snow."

Also, don't forget upcoming command festivities happening. The annual NMRC/WRAIR Winter Ball will be held at the Rockville Hilton on Friday, Dec. 5, 2014. This is a fun event giving you the opportunity to socialize with colleagues and spouses outside the workplace. Tickets are already on sale! Get those Dinner Dress Blues, ball gowns and tuxedos ready, and let's celebrate the holiday season. I look forward to seeing all of you there! I hope you all have a safe and Happy Thanksgiving.

From my family to yours, Happy holidays and have a great Navy day!

Allison Norris

Naval Medical Research Center would like to wish all military active duty, reservists and veterans Happy Veterans Day! Thank you for your continued devotion to protecting the well-being of all Americans!



Graphic illustration by Mikelle D. Smith, Naval Medical Research Center Public Affairs